

## **THE DEVELOPMENT OF DIGITAL ASSESSMENT BLOOM AS ASSESSMENT TOOLS IN JUNIOR HIGH SCHOOL**

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### **Abstract**

The fast and accurate advancement of information and communication demand every education board to be always innovative in developing either the curriculum or the learning models and the assessment tools with which the quality of education could move forward competing with other countries. Hence, the issue of evaluation tools in digital form becomes a noticeable topic. In fact, based on the researcher experience at schools, most of evaluation tools provided still in a paper and pencil test form and do not consider the level of Bloom taxonomy much. Therefore, the researcher is encouraged to conduct this research on the designing of Digital Assessment Bloom (DAB) by using design model of Thiagarajan 4D which consists of: (1) define stage (pre-post analysis, students analysis, task analysis, concept analysis and learning indicator formulation), (2) design stage (media election, format election, and initial design), (3) develop stage (expert appraisal and limited trial test), and (4) disseminate stage. Nevertheless, in this research, the stages only proceed until develop stage with limited trial test. The analysis of the DAB problem items consists of 4 components, they are: (1) problem difficulty degree, (2) discriminating power of the problem, (3) validity of the problem, and (4) reliability of the problem. From the research, the problem difficulty degree is 16.7% which is considered as a hard category with very high reliability coefficient. Meanwhile, 12.5 % of the problems have a very good discriminating power and 37.5% of the problems have a good validity. The positive responses of the students involved in the limited trial test suggest that they are interested in using DAB in doing mathematical tasks. Therefore, this DAB have fulfilled valid, reliable, and practical criteria.

**Key words:** Assessment, Bloom Taxonomy

## **INTRODUCTION**

Hong Wang (2009) state that in some testing applications, Computer Based Test (CBT) delivery is gaining popularity over the traditional Paper Pencil-Test (PPT) delivery due to the several potential advantages that it offers, such as immediate scoring and reporting of results, more flexible test scheduling, the opportunity to include innovative item formats that are made possible by the use of technology, and reduced costs of test production, administration, and scoring.

Recently, integration of technology in learning and assessment are becoming basis needs in education. One of possibility to integrate technology with assessment is through electronic assessment (e-assessment) based on revise taxonomy bloom. However, there are important question which is to be considered, for instance, who is providing e-assessment? Whether e-assessment which is available in the school is suitable the curriculum and teaching needs? So that's why, teacher should produce e-assessment which is refer to revise taxonomy

bloom that can measure overall student's ability especially in mathematics domain.

According to Benjamin S. Bloom (1956) divides this domain consists of six stages that arranged from the simplest to the most complex capabilities. By knowing these classifications should teachers can improve student learning outcomes to see whether the indicators of success has been achieved through specific learning objectives, regard to cognitive, affective and psychomotor.

In this research, we will develop digital assessment bloom as an assessment tool which is referring to revise taxonomy bloom. Moreover, teacher could insert and provide text, image, graphic, video, voice, animation and feedback in this tool. So, students will obtain knowledge, comfort and concrete experience when they answer all questions in digital assessment bloom. Those feelings are never be found when they do that in paper and pencil test.

*Digital Assessment Bloom* will be developed based on 4D model Thiagarajan of development. The model of teaching and learning development consists of the following steps: (1) define, (2) design, (3) develop, and (4) disseminate. This 4D model is chosen considering several aspects related to the education and the teaching itself. Those aspects, like the curriculum, the students, the concepts, the tasks, and the indicators, are important in developing either a learning activities or digital evaluation tool for the students.

### **Formulation of the problem**

Regarding to the research background above, the research questions of the study are as follows:

- a. How is the process of the development of Digital Assessment Bloom as evaluation tool based on revised Bloom Taxonomy, in particular, for mathematics topic of plane figure and similar triangles, cylinder, cone, and sphere and statistic at grade IX odd semester?
- b. How is the result of the development of Digital Assessment Bloom as evaluation tool based on revised Bloom Taxonomy, in particular, for mathematics topic of plane figure and similar triangles, cylinder, cone, and sphere and statistic at grade IX odd semester?

### **Goal**

Regarding to research question above, there are purposes of this study as detailed below. The study will:

- a. Describe the process of the development of Digital Assessment Bloom as evaluation tool based on revised Bloom Taxonomy, in particular, for mathematics topic of plane figure and similar triangles, cylinder, cone, and sphere and statistic at grade IX odd semester.
- b. Describe the result of the development of Digital Assessment Bloom as evaluation tool based on revised Bloom Taxonomy, in particular, for mathematics topic of plane figure and similar triangles, cylinder, cone, and sphere and statistic at grade IX odd semester

### **Benefit of the research**

Regarding to the purpose of the study above, there are benefits of this research as follows:

- a. For mathematics teacher: this study will give alternative assessment tools which is integrate with technology on 9<sup>th</sup> grade mathematics topic. This tool can be used as warming - up for those students before they will encounter national exam.
- b. For students : this study is expected to make student challenged and interested in solving problems which is presented by digital assessment bloom on 9<sup>th</sup> grade mathematical topic, such as, the similarity of plane figure and triangle, curve surface space figure, and statistics.

- c. For researcher : this study is expected to make other researcher to continue developing digital assessment bloom based on revise taxonomy bloom by creating other problems type such as essay and short answer problem. Hopefully, others could finish this study until disseminate stage of 4D Thiagarajan design research.

## **RESEARCH METHOD**

This study is conducted in SMPN 6 Surabaya until limited trial test stage with 5 chosen students. The researcher decides to choose 9<sup>th</sup> grade due to the fact that those student will encounter national final exam and they have mastered all mathematics topics from 7 until 9 grades.

Mathematical evaluation tool which is developed in this development research is the Digital Assessment Bloom as a digital-based mathematical evaluation refers to the revise bloom taxonomy on the mathematics topic class IX on the odd semester include and congruent triangles, curve surface space figure, and statistics. The model used is based on the development of 4D models namely Define, Design, Develop, and Disseminate which is developed by Thiagarajan. While the implementation phase disseminate not conducted in this study. Moreover, the stage of develop is only to limited trial test. The result of this study is the final product of development research that is digital assessment bloom.

The first stage of the Thiagarajan's development model is define comprise to pre and pra- analysis, analysis of student, concept analysis, task analysis and formulation learning indicators. After that, researcher start to design digital assessment bloom on 9<sup>th</sup> grade mathematic topic in odd semester, such as, the similarity of plane figure and triangle, curve surface space figure, and statistics by considering media selection, format and the manufacture of the preliminary design.

After the draft 1 of digital assessment bloom has been resulted, it will be validated by expert appraisal to obtain evaluation, critic, and suggestion about draft 1 of DAB (digital assessment bloom). Then, its suggestion will be used to revise the draft 1 of DAB become the draft II of DAB and it will be validated by expert appraisal too. This process continues until they agree that DAB that has been tested is ready to use for students in the limited trial test.

Moreover, there are several activities that need to do in limited trial test, such as:

- (1) Students have to get prerequisite knowledge, which is mathematics topics in odd semester in 9<sup>th</sup> grade, such as the similarity of plane figure and triangle, curve surface space figure, and statistics. While, they are given an opportunity to try digital assessment bloom, researcher ask students to fill out self assessment sheet which contains task or indicator DAB ability that relate to commands in DAB.
- (2) After students use DAB, then fulfillment student questionnaire responses is done.
- (3) Researcher does an interview limited trial test participants to clarify their answer on questionnaire.

## **RESULT AND DISCUSSION**

The development of DAB uses the 4D development model of Thiagarajan. The 4D model consists of define phase (pre-post analysis, students analysis, tasks analysis, concept analysis, and learning indicators formulation), design phase (media election, format election, and initial design), develop phase (expert appraisal and limited trial test), and disseminate phase. Nevertheless, in this research, we only conduct the research until develop phase through limited trial test. In define phase, the result of pre-post analysis suggest that the curriculum used in the recent school is KTSP with the topics of similarity and congruence triangles, curved sides

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space figure, and statistic are taught on grade IX in odd semester. The students' analysis shows that the students tend to easily feel bored and lazy while doing tasks on paper and pencil test. In fact, they are accustomed to use information Technology tools like desktop computer and laptop. On the tasks analysis, researcher identifies the indicators on the topics of similarity and congruence triangles, curved sides space figure, and statistic. Meanwhile, on the concept analysis, the researcher obtains a concept map on the topics of similarity and congruence triangles, curved sides space figure, and statistic.

The results of the tasks and concept analysis, then, are used for formulating the mathematics evaluation problems based on revised taxonomy Bloom. The next phase is the design phase where the DAB is being developed. Macromedia flash 8 is used as the main developing software to build the DAB. The initial step in developing the DAB comprise of making initial design of the DAB on Microsoft word. Then, the raw image design is imported and edited by using adobe photoshop before being developed on Macromedia Flash 8. After developing and editing the application in Macromedia Flash 8, the product is resulted in swf application file by which the DAB application can be transferred from one computer into other computers and used as long as the flash player is installed. The initial draft of the DAB, we call draft DAB I, is, then, validated twice through expert appraisal to collect evaluation and improvement suggestion from the experts, 1 mathematics teacher, 3 college friends and 3 Master students who is the expert on assessment domain. The result of the validation is used for revising draft DAB I into draft DAB II and draft DAB III which is, then, tested in limited case on 5 students grade IX-E SMPN 6 Surabaya. From the result of limited trial test, the data of students ability in using the DAB and the test item analysis of the DAB .

The DAB is a application of evaluation tools which can be run using computer or notebook as long as flash player installed. The DAB content framework, which consists of the topics of similarity and congruence triangles, curved sides space figure, and statistic, is divided into title page, content page (the DAB test items based on revised Bloom Taxonomy), and closing page. On the title page, there are 2 input boxes of name and class by which the DAB application will not proceed into the next page unless the student input his/her name and class on them. On the clossig page, the student's answer is provided along with the grade. The test key answer is also available there.

The students' ability in using the DAB is the ability of the students in working and operating the navigation within the DAB application as described as navigation ability indicators in self assessment paper. Those ability comprise of a set of activities which are starting and closing the program, inputting name and class, choosing answer, using page navigation buttons, using outline, using confirmation button, and playing with audio plug-in. based on the result from self assessment paper, all students participant in the limited trial test are able to operate the DAB application. It is supported from fact that the whole navigation indicators are completed and there is no significant question regarding navigation issues from the participants.

The analysis of DAB evaluation test items consist of 4 components which are calculating difficulty test level, finding test item distinguishing factors, and calculating validity and reliability (Arikunto, 2008). The difficulty test level results 4 item tests (16,7%) in hard difficulty category (item number 6, 12, 18, and 24), 11 item tests (45.8 %) in medium difficulty category (item number 4, 5, 9, 10, 11, 15, 17, 20, 21, 22 dan 23), and 9 item tests (37.5 %) in easy difficulty category (item number 1, 2, 3, 7, 8, 13, 14, 16 dan 19). The analysis of the test item distinguishing factors results 3 items (12.5 % ) have very good distinguishing factor (item number 5, 11, dan 23), 11 items (45,8 % ) have good distinguishing factor (item number 3, 4, 6, 9, 10, 12, 17, 20, 21, 22, dan 24), 3 items (12.5 % ) have average distinguishing factor (item number butir 8, 14, dan 16), and 7 items (29 % ) have low distinguishing factor (item number 1,

2, 7, 13, 15, 18, and 19). The validity of the DAB test items analysis results 6 test items (25 %) in a very good category (item number 5, 9, 11, 20, 21, dan 23), 2 test items (8,3 %) in a good category item (item number 6 and 24), 9 test items ( 37.5 % ) in a average category (item number 3, 4, 8, 10, 12, 14, 16, 17, 22, and 24), and 7 test items (29 %) in a low category (item number 1, 2, 7, 13, 15, 18, and 19). Based on the test item analysisi using half divition method, the researcher obtain  $r_{11} = 0.91$  as relation coefficient. This means that the test reability is in very high category because  $0.9 \leq r_{11} \leq 1.00$ .

Positive responses from the students are collected from the limited trial test. They are interested in the using of the DAB working on mathematics task. They also comment that the tests are quite challenging and difficult enough. Hence, they can reflect their own competency by solving the tasks in the DAB.

## **CONCLUSION AND SUGGESTION**

To sum up, it can be concluded that given the results of the study are positive, the digital Assessment Bloom can be used as an alternative evaluation or assessment tool. For other researchers who are interested in developing this assessment tool, we advised to develop DAB with different forms of test questions such as essay and short-answer question due to researchers here just developing a form of multiple choices. Moreover, this study is only to a limited test phase, then others could conduct a research similar to this study until disseminate stage to learn more about the effectiveness of the use of DAB in various grade levels or schools. Hopefully, developers are expected to make DAB with good quality in terms of both appearance and matter so that students get a reliable evaluation tool that can be used in any level. So, students should be able to utilize DAB effectively for independent exercises. While parents need to have insight about DAB and they are expected to facilitate this to their children.

The weakness in this study is the presented question or task only limited to multiple choice questions. So that it cannot accommodate some aspects of the question which in stage c5 and c6 refers to the revision of Bloom's taxonomy. So for a more in-depth research needs to be assessed on the use of essay and short answer problems on developed DAB.

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